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X-ray conversion efficiency using a high average power Nd:glass laser system*

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Proximity x-ray lithography requires a high average power source of x-rays with photon energy around 1 keV. A viable laser-based x-ray source can meet the requirements of this application using Nd:glass laser technology. We have measured x-ray conversion efficiency from plasmas produced with a prototype high average power Nd:glass laser. This laser produced pulses of 13 ns FWHM duration with maximum energies of 20 J at 1.053 μ m wavelength and 12 J at 0.527 μ m wavelength. Solid targets of various L-shell emitters as well as one M-shell emitter (solid Xe) were examined using the fundamental and frequency-doubled wavelengths produced with this laser. Conversion efficiencies better than 12%/(2 π sr) were measured for all targets using 0.527 μ m laser light.

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